FEDERAL AID
IN
FISH RESTORATION

STATE OF: Idaho

PROJECT NO: F-75-R-3

SUBPROJECT NO. 2: Coldwater Fish Investigations

STUDY NO. 3: Cabinet Gorge Kokanee Hatchery Enhancement

JOB NO. 1: Staff and Operate Cabinet Gorge Hatchery
JOB NO. 2: Evaluate Rearing Techniques

JOB TITLE: Cabinet Gorge Hatchery Evaluation

PERIOD COVERED: July 1, 1987 to June 30, 1988

September 1988

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Abstract

The total number of kokanee trapped at Cabinet Gorge Hatchery was estimated at 4437. Of these 1799 females yielded 605,632 green eggs. These eggs accounted for 3.8 percent of the yearly total of 16,015,000 green eggs. The remaining 96.2 percent were received from Sullivan Springs. Survival to release was estimated at 81.3 percent, resulting in 13,027,000 fry weighing a total of 28,670 pounds, for release in the Pend Oreille lake drainage in June and July, 1988.

Water Temperature

Water temperature n the large well field ranged from a high of 16.2 centigrade (61.2 F) on November 1, 1987, to a low of 0.9 centigrade (33.6 F) on April 24. Temperatures in the tempering spring ranged from a low of 5.9 centigrade (46.2 F) on November 1, to a high of 10.0 centigrade (50 F) on April 7, 1988 (Figure 1). A mixture of these two water sources allowed incubation water to be tempered to a range of 3.1 C to 10.8 C. Early rearing water was also tempered during feed training and maintained between 6.0 and 7.0 centigrade (42.3 - 44.6 F) (Figure lb).

Fish Trapping

The Cabinet Gorge fish trap was in operation from October 20, 1987 to .January 10, 1988. Kokanee began entering the trap on October 30 with the last kokanee trapped and spawned December 31, 1987. Trapping yielded a, total of 4437 late run kokanee (43% females and 57% males) (Table I). Prespawning mortality of females was 7.4'.; compared to 1986 figures of 21.7. This reduction in prespawning mortality was attributed to reduced handling, prespawn sorting and segregation, and the use of tempered water from the completed lower springs expansion project.

Table 1. Late run kokanee trapping a Cabinet Gorge Hatchery, 1987-88.

Month	Total	Males	Females	Prespawning Female Mortality
	1987-(1986)	1987-(1986)	1987-(1986)	1987-(1986)
Nov	3218 (1950)	1942 (1169)	1276 (781)	18 (143)
Dec	1219 (935)	573 (406)	646 (529)	125 (143)
Jan	0 (66)	0 (13)	0 (53)	0 (10)
Total	4437 (2951)	2515 (1588)	1922 (1363)	143 (269)

Spawntaking and Eggs Received

Spawntaking began in early November and continued through early January. The spawning operations peaked in early December at Sullivan Springs and mid-November at Cabinet Gorge Hatchery (Figure 2).

A total of 16,015,000 green kokanee eggs were received at Cabinet Gorge Hatchery during the 1987-88 production year. Of these, 605,700 were collected from 1799 female kokanee at Cabinet Gorge Hatchery and the remaining 15,409,300 were received from the Sullivan Springs trap (Figure 3).

Figure 1. Profile of water temp. and

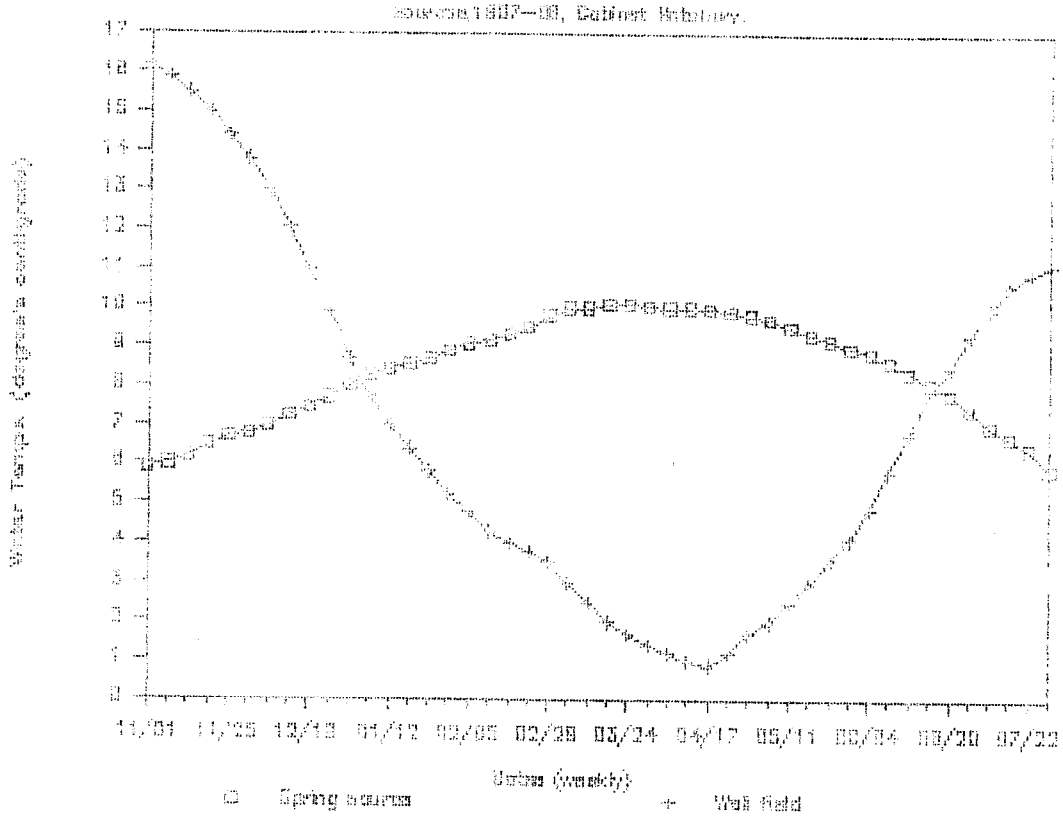


Figure 1b. Profile of water use in

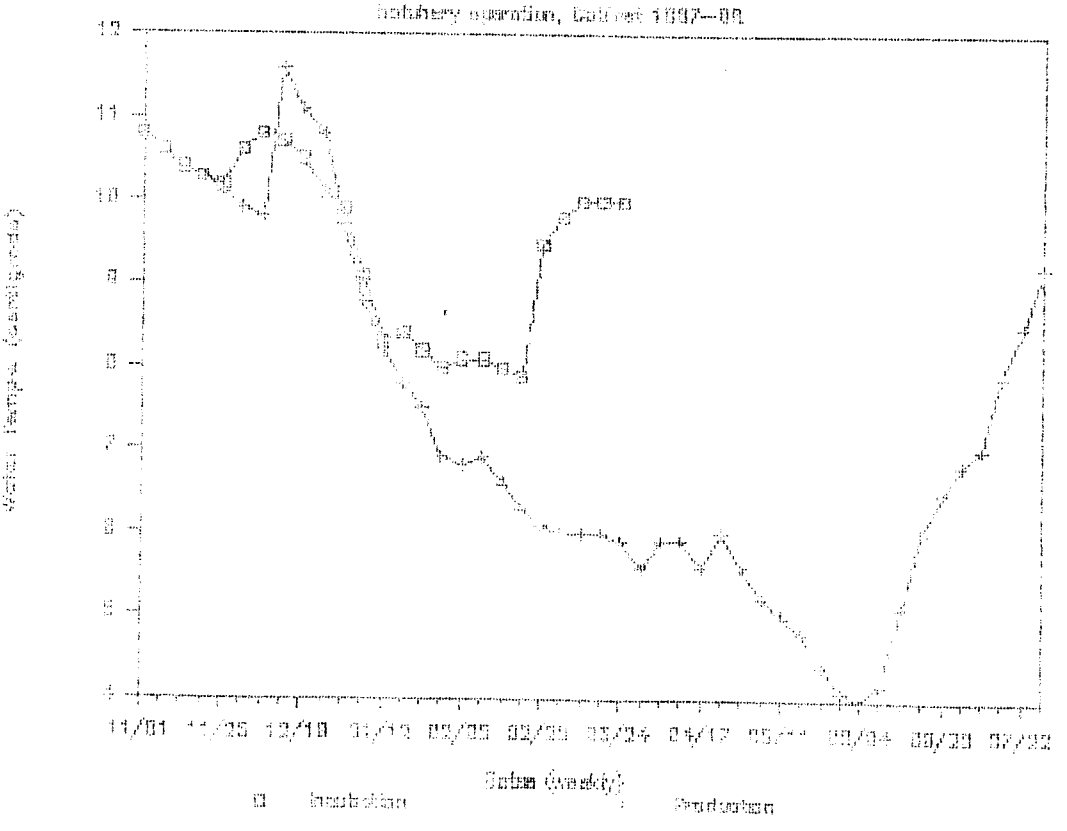


Figure 2. Egg takes by date and location
Cabinet Gorge Hatchery, 1987-88.

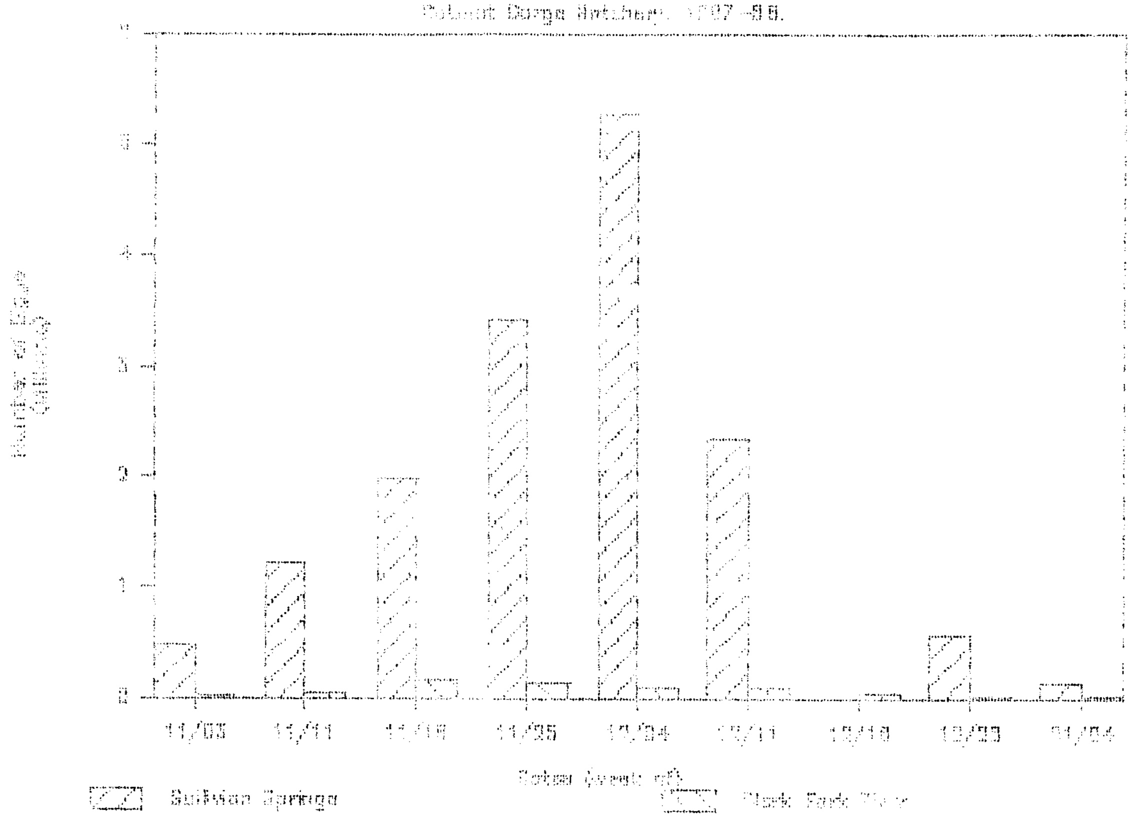
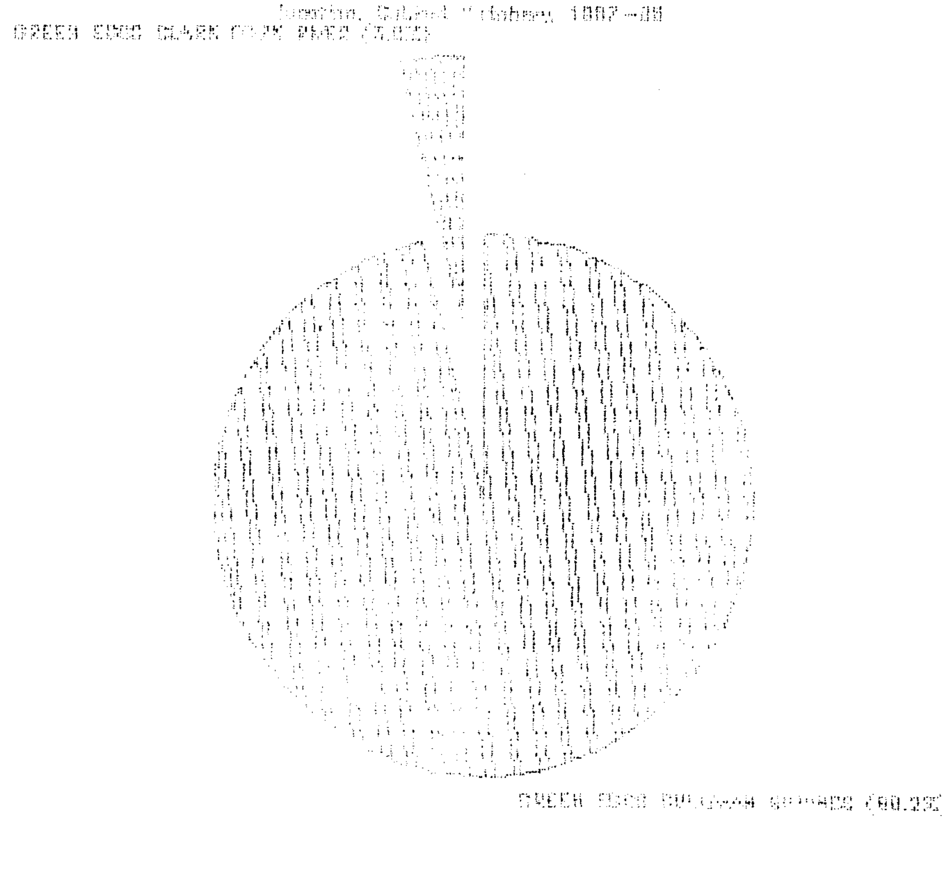


Figure 3. Percentage of eggs taken by
location, Cabinet Gorge Hatchery 1987-88



Fish Production and Health

Survival of green eggs to feeding fry was estimated at 88.2 percent (1986-87 88.6%). Survival from first feeding to release was estimated at 92.2 percent (1986-87 90.8%), resulting in survival from green egg to release of 81.3% (1986-87 76%) (Table %.)

Table 2. Survival summary, kokanee salmon, Cabinet Gorge Hatchery, 1987-88.

		SURVIVAL		
Lot #	Number Green Eggs	Green Egg to First Feeding	Green Egg to Release	Feeding Fry to Release
SS1	2,468,815	.915	.879	.960
SS2	2,581,454	.867	.707	.816
SS3	2,472,751	.892	.838	.939
SS4	2,563,762	.897	.849	.946
S35	2,774,189	.890	.786	.883
SS6	2,550,397	.842	.829	.985
CFI	893,042	.807	.778	.964
CF2	212,190	.888	.869	.978
Total	16,018,000	.882	.813	.923

A total of 13,027,000 kokanee fry were produced at an average weight of 2.20 pounds per thousand, a total of 28,670 pounds produced. These fish gained 26,382 pounds from 26,411 pounds of feed, a conversion rate of 1.0:1 (Table 3).

Table 3. Kokanee production summary, Cabinet Gorge hatchery, 1986-87.

Lot *	Number Produced	Pounds Produced	Pounds Per 1000	Feed Fed	Weight Gain	Conv.
SS1	2,166,963	5,13l	2.37	4,735	4,730	1.0
SS2	1,826,924	4,060	2.22	4,034	3,890	1.09
352	2,071,936	4,665	2.25	4,159	4,208	.96
SS4	2,176,712	4,525	2.08	3,985	4,171	.96
SS5	2,180,489	4,608	2.11	4,167	4,367	.95
536	2,114,741	4,051	2.10	4,200	3,969	1.06
CF1	305,922	791	2.58	725	738	.98
CF2	184,312	439	2.38	406	409	.99
Tot/Ave	13,027,000	28,670	2.20	26,411	26,382	1.00

Fish Marking

Five different release groups were marked individually (Table 4). Clark Fork River release, Clark Fork River barge release, and the Sullivian Springs release had fin clip sample groups within the release groups. TM100 fed at 5.5 percent of feed weight for ten days to the fish of the barge, open north, and open south release groups was the other type mark. A total of 50,000 Clark Fork River release fish were marked with a left ventral fin clip, 40,000 Sullivian Springs release fish were marked with a adipose fin clip, and 40,000 of the Clark. Fork River barge release fish were marked with a right ventral fin clip. An attempt to mark fish from a cross section of lots with a temperature mark was unsuccessful because of fluctuations in rearing temperatures. (Table 4).

Table 4. Differential marks applied to different release groups of kokanee fry produced at Cabinet Gorge Hatchery, 1987.

Release Date	Release Site	* Fish Released	Fin Clip			
			TM100	Ventral Left	Ventral Right	Adipose
June 15	CFR-CGH	3,413,700		X		
June 25	Open North	1,607,000	X			
July 5-9	Barge CFR	1,297,000	X		X	
July 11-14	SS	5,138,987				X
July 27	Open South	1,570,000	X			

Fish Liberations

During June, 1988, 3,413,700 fish were liberated from Cabinet Gorge Hatchery into the Clark Fork River and 1,607,000 were released into the north end of Lake Pend Oreille near Warren Island. During July, 1988, 8,006,300 were liberated from Cabinet Gorge Hatchery. Of these, 5,138,800 were released in Sullivian Springs, 1,297,000 were barged down the Clark Fork River and released in Pend Oreille lake at the mouth of the Clark Fork River, and 1,570,500 were released into the south end of Pend Oreille lake, off shore from Bayview, Idaho (Table 5).

Table S. Late kokanee liberation from Cabinet Gorge Hatchery, July 1988.

Date	Release Site	# Fish Released	Total Pounds	Length inches	#/lb
	(Clark Fork River)				
June 15	Cabinet Hatchery	3,413,700	8453	2.0	403
July 5-9	Clark Fork barge to lake Pend Oreille	1,297,000	2718	1.9	479
sub total	Clark Fork River	4,710,700	11171	1.98	429
July 11-14	Sullivian Springs	.5,138,800	10947	1.90	460
Sub total	Sullivian Springs	5,138,800	10947	1.90	460
	(Pend Oreille Lake)				
June 25	Open Water North	1,607,000	2981	1.8	535
July 26	Open Water South	1,670,500	367I	2.0	435
sub total Pend Oreille Lake		3,177,500	6552	1.90	48S
Total Pend Oreille Drainage		13,027,000	28670	1.94	465

Special Studies

An alternate method of fungus control for eggs was tested during 1987 - 88 at Cabinet Gorge Hatchery. Approximately 1,050,000 green eggs from Sullivian Springs egg takes sixteen and seventeen were placed into upwelling (barrel type) incubators (120,000 per incubator). Three incubators were not treated with the usual formalin treatments, instead the flow was adjusted up to a level so the eggs were at a point of just rolling. Fungus growth and egg loss were monitored with the following results (Table 6).

Table 6. Results of alternative fungus control experiment at Cabinet Gorge Hatchery, 1988.

	Formalin Control			Roll Test		
Egg Take	Green Eggs	Sac Fry	%Sur.	Green eggs	Sac Fry	%Sur
16	245,606	206,129	83.9	120,713	107,134	88.8
16	247,368	215.048	86.9	121,994	110,397	90.6
17	211,939	173,299	81.8	120,330	91,804	76.3
Total/Ave.	704,903	594,476	84.3	363,037	309,135	85.2